Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Allocation of Spectrum Below	)	ET Docket No. 94-32
5 GHz Transferred From	)	
Federal Government Use	)	

COMMENTS OF NORAND CORPORATION

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December 19, 1994

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SUMMARY

The Commission has proposed to reallocate 50 megahertz ("MHz") of spectrum in the bands 2390-2400 MHz, 2402-2417 MHz, and 4660-4685 MHz from Federal Government use to private sector use. Norand opposes the proposal in the Notice to allocate the 2402-2417 MHz band to fixed or mobile services. This portion of the band should remain available for use by Part 15 devices.

Norand is a manufacturer of portable computing devices used commercially in indoor and mobile applications. Norand also produces premises-based wireless networking products that allow portable devices to operate without wire connections in traditional wired computer network infrastructures. Norand systems primarily are used to automate their workers to significantly improve productivity, to simplify and enhance core business processes to control inventories, and to gather real time market information.

Norand products are used to provide workers with access to time critical information. They provide customers with real-time information management capabilities without intervening data entry or processing delays, or the potential errors of batch or paper based systems. Mobile data collection allows manufacturers to monitor inventories, track sales, and operate just-in-time distribution. Norand also produces wireless local area networks ("LANs") to connect portable personal computers. In addition to marketing its products in the United States, approximately 20 percent of Norand's revenues come from exports. Norand has significant exports to Canada, Latin America, Europe, and the Asia-Pacific region.

The Commission has proposed that the 2402-2417 MHz band be allocated to fixed and mobile services. The 2400 MHz band is currently available for use by Part 15 devices and by industrial, scientific, and medical applications. Several of Norand's mobile data communications devices operate in this band under Part 15. Manufacturers have made significant investments in developing products for this band. These Part 15 products perform functions for businesses and consumers that are not available nor are economically feasible from licensed services. New products developed for use in this band, such as wireless LANs, are expected to grow into multi-billion dollar markets. The products, and the services they perform, will only be available if the Commission leaves spectrum available.

The 2400 MHz band is best suited for Part 15 and ISM uses. The interference caused by microwave ovens operating in this band would make licensed use of 2402-2417 MHz difficult and extremely expensive. Part 15 uses, on the other hand, work well in this band because of the low-power spread spectrum technology employed. The Commission itself has previously concluded that reallocation of this band to licensed use would jeopardize the Part 15 investment and that licensed use of this spectrum would be of less value than Part 15 use. The Commission, therefore, should not change the allocation of this spectrum.

Norand strongly believes that the spectrum allocation process should be used to make a wide variety of services available to the public and should not be focus on the potential funds that could be raised by spectrum auctions. Although the Budget Act grants the Commission the ability to use competitive bidding to award licenses, auctions may not be used to allocate spectrum. Furthermore, certain types of service, such as Part 15, are not susceptible to competitive bidding.

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Norand Corporation, by its attorneys, hereby comments on the Commission's Notice of Proposed Rulemaking to reallocate 50 megahertz ("MHz") of spectrum in the bands 2390-2400 MHz, 2402-2417 MHz, and 4660-4685 MHz from Federal Government use to private sector use.[1] Norand opposes the proposal in the Notice to allocate the 2402-2417 MHz band to fixed or mobile services.[2] This portion of the band should remain available for use by Part 15 devices.

I. INTRODUCTION AND INTEREST OF NORAND

Norand is a manufacturer of portable computing devices used commercially in indoor and mobile applications. Norand also produces premises-based wireless networking products that allow portable devices to operate without wire connections in traditional wired

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[1] See Notice of Proposed Rulemaking, Allocation of Spectrum Below 5 GHz Transferred From Federal Government Use, ET Docket No. 94-32, FCC 94-272 (released Nov. 8, 1994) [hereinafter "Notice"].

[2] Norand expresses no views with respect to the disposition of the 2390-2400 MHz and 4660-4685 MHz bands.

computer network infrastructures. Norand systems primarily are sold to commercial business users targeting customers seeking to:

- automate their workers to significantly improve productivity per employee;
- simplify and enhance core business processes to control inventories, and speed business processes; and
- gather real time market information to ensure that their customers' needs are constantly being met.

Norand has grown significantly in its twenty-five years in existence, experiencing double digit growth rates to a current annual sales rate of $193 million with profits of $17.2 million. To maintain such a strong growth rate, Norand consistently spends a significant portion of its revenues (10.6 percent in 1994) on research and development, to improve current products and to develop new markets.

Norand's equipment line includes handheld and industrial-mobile computer products for the real-time wireless data exchange between mobile users within building or campus environments, and business computers or computing networks. Norand has been a pioneer in the field of mobile computing. It has been producing mobile radiofrequency ("RF") devices for ten years. Over half of Norand's products incorporate some type of interactive RF data communications, operating under Part 15 and Part 90 of the Commission's rules.

Norand products are used to provide workers with access to time critical information. They provide customers with real-time information management capabilities without intervening data entry or processing delays, or the potential errors of batch or paper based systems. Mobile data collection allows manufacturers to monitor inventories, track

sales, and operate just-in-time distribution. Product delivery information is simplified by the use of Norand's mobile products. Norand produces full systems, including handheld mobile devices, infrastructure components that provide the wireless connection to computer networks, and communications and applications software for information management.. Norand also works with numerous resellers and software development companies that target specific applications and industries. Norand invented route distribution portable data systems for use with delivery vehicles in 1978. Over 140,000 Norand route distribution systems are currently in use, this amounts to more than half of all systems currently in operation. Newer Norand products such as wireless local area networks ("LANs") connect portable personal computers.

In addition to marketing its products in the United States, approximately 20 percent of Norand's revenues come from exports. Norand has significant exports to Canada, Latin America, Europe, and the Asia-Pacific region. Mobile data communications equipment manufacturers like Norand create high-skill, high-wage jobs for American workers and contribute favorably to the nation's trade balance.

The Commission has proposed that the 2402-2417 MHz band be allocated to fixed and mobile services.[3] The 2400 MHz band is currently available for use by Part 15 devices[4] and by industrial, scientific, and medical ("ISM") applications.[5] Several of Norand's mobile data communications devices operate in this band under Part 15.

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[3] Notice ¶ 9.

[4] See 47 C.F.R. § 15.247 (1993).

[5] See id. § 2.106.

Additionally, Norand has expended significant sums for the development of future products that utilize this band of spectrum. Currently, Part 15 devices must not interfere with licensed devices and must accept interference from licensed operations.[6] Many licensed uses of the band would cause interference with Part 15 transmission. Such interference would make Part 15 use impractical for some applications. The 2402-2417 MHz band comprises about 20 percent of the 2400-2483.5 MHz ISM band that is available for Part 15 use. Part 15 use could be confined to spectrum that is most affected by microwave ovens,[7] reducing its viability for Part 15 use. Most importantly, large investments in system design and engineering would be lost as systems would have to be reengineered to reflect the reduction in available spectrum.

The other band currently available for Part 15 use, 902-928 MHz, is the subject of another Commission proceeding that might limit Part 15 users of access to that band.[8] Norand strongly urges the Commission to preserve the enormous benefits available from Part 15 devices by not allocating this band of spectrum to other uses.

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[6] Part 15 devices are required to not interfere with licensed services and to accept interference from licensed services. 47 C.F.R. § 15.5.

[7] The 2400-2402 MHz portion of the band would also be lost because it would be impractical to use this portion without the adjacent 2420-2417 MHz band.

[8] For the reason discussed at 8-9 infra, while spectrum above 5 GHz is allocated to Part 15 devices, its use today is not economical.

II. PART 15 DEVICES PROVIDE VALUABLE SERVICES NOT OTHERWISE AVAILABLE TO CONSUMERS AND BUSINESSES.

Over the last two decades, Part 15 devices, such as cordless telephones, wireless speakers, and wireless alarm systems, have become ubiquitous in American homes. The revisions to Part 15 regulations in 1986 altered the regulatory framework to encourage the use of Part 15 devices for commercial applications. Following the Commission's lead, businesses have embraced the use of Part 15 devices in a variety of settings. In addition to the Norand products described above, business oriented Part 15 devices include wireless LANs, automated meter reading systems, inventory control systems, and delivery control systems. Billions of dollars are spent on Part 15 devices by consumers and business each year. Part 15 devices provide convenience to consumers and assist in efficient operation to businesses.

Since the Commission specifically encouraged the use of spread spectrum Part 15 devices, enormous sums of money has been spent to develop a multitude of products for consumers and businesses. There is an installed based of millions of Part 15 devices that represent many billions of dollars of investment. Many businesses literally could not function without the information and support provided by Part 15 devices. Usage of Part 15 devices continues to grow at an astounding rate, as new products are development to meet the needs of consumers and businesses. By declining requests to dedicate spectrum to computer communications, the Commission has encouraged Part 15 use to satisfy that application also. The phenomenal growth of this market is a testament to the wisdom of the Commission's policy and the existence of spectrum in which the devices can operate.

In many ways, the Part 15 market is the epitome of the kind of open, competitive, and innovative market that the Commission is attempting to foster generally. Part 15 is the grassroots of the communications industry. Individuals and small business can create sophisticated communications systems without seeking service from carriers or involving the regulatory process. Attempting to meet communications needs met by Part 15 devices over cellular-like common carriers may be economically and technologically infeasible. Because of its low cost, many innovative new services are being created using Part 15 devices that would not otherwise be economically feasible. Part 15 is one of the most free, most competitive communications markets. These attributes are not easily replicated.

In the 2402-2417 MHz band proposed for reallocation in the Notice, the most significant Part 15 uses are for cordless phone and wireless LANs. The consumer convenience of cordless phones is obvious. The business advantages of wireless LANs are less obvious, but striking nonetheless. Wireless LANs offer the portable personal computers the ability to communicate with other computers in its network without access to wireline connections. The wireless LAN market is expected to explode from approximately $70 million in 1993 to over $1.7 billion by the year 2000.[9] The market for equipment used to support wireless LANs is already $500 million and expected to grow as fast as the wireless LAN market itself, making it a potentially multi-billion dollar market. With tens of millions of portable PCs already in use, demand for wireless LAN capability is likely to increase as

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[9] "Wireless Office Market to Balloon Nearly 20-Fold, Led by LANs, Approach $2 Billion by 2000," Edge (Oct. 31, 1994).

knowledge of this new technology become widespread. Annual sales of wireless LAN cards alone is expected to grow to 1.7 million units by 1998.[10]

Wireless LANs are likely to grow faster than data communications operating over licensed spectrum because of their enormous cost advantage. Communications over metropolitan area networks using common carriage facilities incurs significant airtime charges which discourages their use. Wireless LANs require no airtime charges. Because of the nature of the software operating systems on which all current LANs operate, it is unlikely that use of common carrier facilities for wireless LAN communications will be economically feasible for some time. The operating system software was designed for wired connections and was not designed to conserve bandwidth or "broadcasting" time. To make LANs less costly for licensed wireless transmission would require completely rewriting the software at enormous expense. Given the huge embedded base of operating systems already being used, it is unlikely that the market would accept such a radical change in software. Furthermore, licensed wireless common carriage is not an economical vehicle for multimedia applications, which require greater bandwidth. Lastly, an attempt to create such a licensed service capability would require an enormous investment in infrastructure, an expense that would be unnecessary if Part 15 use can continue. If wireless LANs cannot operate under Part 15, it is unlikely that a licensed service alternative will be readily available.

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[10] J. Brown, "Wireless Computing: Hardware," Computer Reseller News (Sep. 12, 1994) at 128.

The Commission should take appropriate steps to ensure that the public benefits of Part 15 devices are not diminished subject to the interference constraints of an ISM band.

III. THE 2402-2417 MHz BAND SHOULD BE ALLOCATED PRIMARILY FOR PART 15 USE, SUBJECT TO ITS USE AS AN ISM BAND.

In the Notice, the Commission proposes that the 2402-2417 MHz band be allocated generally to fixed and mobile services with the intention of auctioning the spectrum for use by as yet unspecified services. Norand disagrees. Norand believes that the best and most intensive use of this band would be to continue to allocate it to Part 15 use, subject to the interference caused by its use as an ISM band.

The availability of this band for significant Part 15 use is crucial in maintaining current Part 15 usage and to ensure unimpeded access to new and improved Part 15 applications in the future. Only 902-928 MHz and 2400-2483.5 MHz can currently be practically utilized by Part 15 devices.[11] An additional band above 5 GHz is allocated for this purpose; however, it is not economical to operate on this band using current technology. Operations over 5 GHz would require significantly more infrastructure and would dramatically increase the cost of systems.

The 902-928 MHz band is the subject of another Commission proceeding that may severely limit its availability for Part 15 use. Thus, the 2400-2483.5 MHz band is the only spectrum that is most readily available to Part 15. The 2402-2417 MHz band

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[11] See 47 C.F.R. § 15.247.

contemplated for reallocation in this proceeding comprises a significant portion of the band available for spread spectrum Part 15 use. It is also anticipated that a significant portion of the higher frequencies in this band may be affected if "guardbands" are established in the probable reallocation of spectrum to mobile satellite service for use by low earth orbit satellite systems.[12] Taking away the 2402-2417 MHz band from Part 15 use would limit Part 15 uses in the entire 2400-2483.5 MHz band.

The 2402-2417 MHz band is poorly suited for licensed services. Its use as an ISM band causes interference that would make licensed operations difficult if not impossible. ISM equipment, including microwave ovens, create an enormous amount of interference "noise" in this band. The installed base of over 80 million microwave ovens will be in use for a long time, constantly causing significant noise problems for this band. Microwave oven use of this spectrum is expected to continue, and the Commission has not suggested that it plans to relocate microwave oven use in the future. Norand believes that the noise problem renders this band inviable for licensed services. The Commission, in a report to the Secretary of Commerce, concluded that this band would provide "less value" for use by the licensed private sector services.[13] Since this band cannot now be utilized efficiently by licensed services, failure to allocate to such services will not deprive users of actual options.

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[12] See Amendment of Section 2.106 of the Commission's Rules to Allocate the 1610-1626.5 MHz and the 2483.5-2500 MHz Bands for Use by the Mobile-Satellite Service, Including Non-geostationary Satellites, ET Docket No. 92-28.

[13] Report to Ronald H. Brown, Secretary, U.S. Department of Commerce, Regarding the Preliminary Spectrum Reallocation Report, 75 R.R.2d 1141, 1149 (P & F) (1994).

Reallocation of the 2402-2417 MHz band also threatens the competitiveness of the United States Part 15 industry abroad. This band is currently used for Part 15-like devices worldwide. For instance, the European Union has allocated 2400-2483.5 MHz to spread spectrum wireless LANs. American manufacturers of Part 15 devices, including wireless LANs, are market leaders, developing new technologies, and exporting a significant amount of their production. If they are forced to reduce domestic use of this band because of the proposed reallocation, continued competition in foreign markets will become more difficult.

Lastly, the Commission should recognize that licensed spread spectrum communications devices can operate in this band only at substantial additional cost. While licensed spread spectrum communications services may technically be able to operate in this band, their use would be inefficient. It has been estimated that implementing a system in this band would cost as much as 50 times as much as in a band without ISM interference.[14]

The Commission also recognized the threat to valuable Part 15 uses by reallocation of this band to the private sector. "[R]eallocation of this band," the Commission concluded, "would jeopardize the significant private sector investment already made in developing new technologies operating under Part 15."[15] It seems illogical to place the investment in and installed base of Part 15 devices at risk to allow licensed use of less value.

The Commission should protect the investment in and benefits of Part 15 activities by declining to allocate the 2402-2417 MHz to other services. Indeed, to give the

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[14] 75 R.R.2d at 1149.

[15] Id.

Part 15 industry some regulatory certainty for future products, Norand urges the Commission to permanently allocate this band primarily to Part 15 and ISM use. The public interest would be best served by protecting the current investment in Part 15 and encouraging new products and technologies.

IV. SPECTRUM SHOULD BE ALLOCATED TO ENSURE THAT A WIDE VARIETY OF SERVICES IS AVAILABLE TO THE PUBLIC, NOT MERELY TO RAISE FUNDS FOR THE FEDERAL TREASURY.

In the Notice, the Commission declines to delineate a specific use for the spectrum being allocated in this proceeding, relying on "a flexible approach that relies substantially on market forces."[16] The Commission then "propos[es] to make licenses for this spectrum available through competitive bidding, to the extent possible and practical."[17] The approach places the cart before the horse. The Commission should first allocate the spectrum in accordance with the public interest, and then grant licenses for the service, using competitive bidding as authorized by statute.

Competitive bidding is frequently an efficient vehicle for distributing scarce resources among potential uses. Norand agrees that competitive bidding should be used in some instances for granting licenses, but it should not be used for allocating spectrum. The Commission acknowledges this distinction in the Notice,[18] but then proposes to justify its

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[16] Notice ¶ 9.

[17] Id.

[18] "We also note that the Commission's authority under Section 309(j) to use competitive bidding is limited to awarding licenses and is not to be used for allocating spectrum." Id. ¶ 9 n.24.

allocation on the basis of the availability of competitive bidding. This is not a rationale method of allocating spectrum.

Moreover, Congress did not envision such a result. Recognizing the temptation of high auction revenues, Congress forbade a public interest finding for the allocation of spectrum on the basis of expected federal revenue from competitive bidding.[19] In the Omnibus Budget Reconciliation Act of 1993,[20] Congress granted the Commission the ability to grant applications for license through competitive bidding.[21] The statute does not grant the Commission the ability to use competitive bidding to allocate spectrum. Congress also strictly limited that situations in which licenses may be granted through competitive bidding to those involving mutually exclusive applications for services wherein the licensee will receive compensation for transmission of communications signals.[22] Thus, Congress carved out a very limited use for competitive bidding, and that did not expressly include spectrum allocation.

Large blocks of prime spectrum are currently allocated to broadcast radio and television. Undoubtedly, if some of all of this spectrum were to be auctioned, large sums would be raised for the federal coffers. Likewise, under the Commission's rationale in the Notice, the spectrum would then be allocated on the basis of "market forces" that would "provide for competition in the provision of new services." The Commission and Congress

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[19] Id. § 309(j)(7)(A).

[20] Omnibus Budget Reconciliation Act of 1993, Pub. L. No. 103-66, 107 Stat. 312 (1993).

[21] 47 U.S.C § 309(j) (1993).

[22] Id. §§ 309(j)(1), 309(j)(2).

correctly recognize the value of public broadcasting media to the American public's economic, social, and political lives.

Likewise, it is in the public interest that some spectrum be available for use by Part 15 devices. As there are only two bands economically available to Part 15 uses in the current allocation and as one of these bands band may be rendered less useful in a separate proceeding, the Commission must take into account the public benefits of Part 15 activities in the 2402-2417 MHz band.

Lastly, it is important to note that certain services are not best licensed through auctions. If all spectrum were allocated by competitive bidding, there would little but mobile telephony and pay television available to the public. The amateur service and Part 15 devices are not susceptible to competitive bidding. As the users of these services do not pay a service provider, neither the users nor the manufacturers would be inclined to pay a "market price" for spectrum. In the case of Part 15, the spectrum is most intensively used when the spectrum is "owned" by no one. The value of the service is that a virtually limitless number of users can operate a multitude of products on the same spectrum on an unlicensed basis. It is unlikely that a single entity could obtain the same level of use on a licensed basis. Thus, auctioning spectrum for Part 15 use would actually be economically inefficient.

V. CONCLUSION

For the foregoing reasons, Norand urges the Commission to protect the valuable investment made in Part 15 devices by allocating the 2402-2417 MHz band for primary use by Part 15 devices.

Respectfully submitted,

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